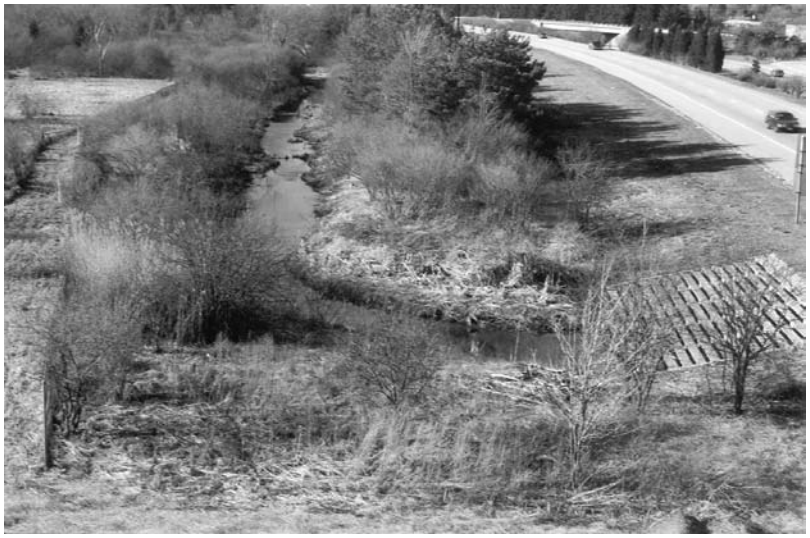
# Hodgson Brook Watershed Monitoring Plan
## *A Guide for Monitoring Environmental Quality*



**2004**

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# Hodgson Brook Monitoring Plan
## *A Guide for Monitoring Environmental Quality*

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## Section 1 Assessing the Quality of Hodgson Brook

Hodgson Brook is an urban stream located in Portsmouth, New Hampshire. The seven-mile long stream is the major source of freshwater to the tidally influenced North Mill Pond. The health of the brook is closely linked to the health of the North Mill Pond. A local organization, the Advocates for the North Mill Pond conducted a comprehensive study of water and environmental quality of the Pond in 1998. Based on this study and the regular sampling of the Brook, it became clear to the ANMP that in order for the environmental quality of the North Mill Pond to improve, the quality of Hodgson Brook must be restored. The ANMP and a group of stakeholders known as the Hodgson Brook Local Advisory Committee created the *Watershed Restoration Plan for Hodgson Brook*. The *Plan* identifies restoration actions and calls for a monitoring plan to measure environmental changes over time.

This document, the *Hodgson Brook Watershed Monitoring Plan*, identifies and sets out a course of action to fill the many data gaps that remain in our understanding of the water and habitat quality of Hodgson Brook. The *Monitoring Plan* is a guide for conducting baseline assessments and monitoring changes in environmental indicators over time.

### 1.1 Introduction

The State of New Hampshire has water quality standards that provide the baseline quality that all surface waters of the State must meet in order to protect their intended uses. These standards are the "yardstick" for identifying where water quality violations exist. They also help determine the effectiveness of restoration and pollution prevention programs (NHDES, 2004). The standards are divided into three parts which are (1) designated uses, (2) water quality criteria and (3) antidegradation.

Designated uses represent the desired uses that a water body should support. There are seven designated uses that the water quality standards are intended to protect. These designated uses are: aquatic life, fish consumption, shellfish consumption, drinking water supply, primary contact recreation (e.g., swimming), secondary contact recreation (e.g., boating), and wildlife.

Water quality criteria are designed to protect the designated uses of all surface waters and are expressed in either numeric or narrative form. A waterbody that meets the criteria for its assigned classification is considered to meet its intended use (NHDES, 2004).

The third and final component of the water quality standards is antidegradation which are the provisions designed to preserve and protect the existing beneficial uses and to minimize degradation of the State's surface waters. For example, antidegradation applies to any proposed new or increased activity that would lower water quality or affect the existing or designated uses.

DES defines each designated use in the *2004 New Hampshire Consolidated Assessment and Listing Methodology*. The following table was taken from that publication. It lists each use, definitions and the applicable surface waters for which assessments are completed.

**Table 1 Designated Uses of State Surface Waters**

| Designated Use (applicable surface waters) | Department of Environmental Services' Definition |
|---|---|
| 1. Aquatic Life (All surface waters) | Waters that provide suitable chemical and physical conditions for supporting a balanced, integrated and adaptive community of aquatic organisms. |
| 2. Fish Consumption (All surface waters) | Waters that support fish free from contamination at levels that pose a human health risk to consumers. |
| 3. Shellfish Consumption (All tidal surface waters) | Waters that support a population of shellfish free from toxicants and pathogens that could pose a human health risk to consumers. |
| 4. Drinking Water Supply (All freshwater surface waters) | Waters that with conventional treatment will be suitable for human intake and meet state/federal drinking water regulations. |
| 5. Primary contact Recreation (All surface waters) | Waters suitable for recreational uses that require or are likely to result in full body contact and/or incidental ingestion of water. |
| 6. Secondary contact recreation (All surface waters) | Waters that support recreational uses that involve minor contact with the water. |
| 7. Wildlife (All surface waters) | Waters that provide suitable physical and chemical conditions in the water and riparian corridor to support wildlife as well as aquatic life. |

The New Hampshire Department of Environmental Services (DES) determines if surface waters of the State meet certain uses based on available data from DES monitoring efforts and other organizations' data. These determinations are made for what DES calls "assessment units or AUs." Each waterbody type in the State (river, stream, lake, pond, estuary, ocean) was divided into smaller segments which are the AUs. AUs are the basic unit of record for conducting and reporting the results of all water quality assessments (NHDES, 2004). Each of the designated uses, with the exception of wildlife, have a methodology that is used to make an assessment decision. An assessment methodology for wildlife has not yet been developed.

DES separates Hodgson Brook into three AUs for determining if the designated uses are met for the Brook. Three of the seven uses were not assessed. The shellfish consumption use is not relevant in freshwater bodies. Hodgson Brook is not a water supply, therefore the drinking water use was not assessed. And, as mentioned previously, an assessment methodology has yet to be developed for wildlife uses. As is the case for

all of the state's freshwater waterbodies, the fish consumption use is impaired based on mercury contamination from atmospheric deposition.

The main stem of Hodgson Brook is impaired for primary and secondary contact recreation based on the presence of high bacteria levels. The other two segments, Lower Newfields Ditch and Lower Grafton Ditch, do not support aquatic life uses, in addition to the fish consumption impairment previously mentioned. Table 2 shows assessed AUs of Hodgson Brook, their designated uses which are of concern, and impairments. Two other segments are not currently included in the DES assessments but are recommended for inclusion. The two segments are Newfields Ditch and Borthwick Avenue Tributary.

**Table 2 Hodgson Brook Assessment Units, Designated Uses and Impairments**

| Assessment Unit | Designated Use | Is the Use Supported? | Cause of Impairment |
|---|---|---|---|
| Hodgson Brook (main stem) | Aquatic Life | Insufficient Information | -- |
| | Primary Contact Recreation | Not Supporting | *E.coli* (bacteria) |
| | Secondary Contact Recreation | Not Supporting | *E.coli* (bacteria) |
| | Fish Consumption | Not Supporting | Mercury |
| Lower Newfields Brook | Aquatic Life | Not Supporting | Benthic-Macroinvertebrate Bioassessment, Habitat Assessment, Manganese |
| | Primary Contact Recreation | Not Assessed | -- |
| | Secondary Contact Recreation | Not Assessed | -- |
| | Fish Consumption | Not Supporting | Mercury |
| Lower Grafton Brook | Aquatic Life | Not Supporting | Aluminum, Arsenic, Chromium (total), Copper, Iron, Lead, Manganese, Zinc |
| | Primary Contact Recreation | Not Assessed | -- |
| | Secondary Contact Recreation | Not Assessed | -- |
| | Fish Consumption | Not Supporting | Mercury |

There are four categories that can be used to describe the status of designated use. These categories are called "use support attainment options". The first category is termed "fully supporting" and means that if there is enough data or evidence to determine that the use is fully supporting, then DES classifies the waterbody as fully supporting its uses. At this point in time, none of the three Hodgson Brook AUs are fully supporting for any of the designated uses.

The next option is termed "not supporting" and basically means that there is enough data or evidence to indicate a problem or what is termed an "impairment" of the use.

Currently, a portion of Hodgson Brook is not supporting primary and secondary recreation (Hodgson Brook main stem) and the other two AUs do not support aquatic life (Lower Newfields Brook and Lower Grafton Brook).

The remaining two categories "insufficient information" and "not assessed" are defined as follows. Insufficient information is assigned to any use associated with an AU that has some but not enough useable data or information to make a final assessment decision. Not assessed is assigned to any use associated with an AU which does not have any useable data or information to make an assessment decision.

## 1.2 Background

Presently Hodgson Brook is divided into three assessment units: Lower Newfields Brook, Lower Grafton Brook, and the main stem of Hodgson Brook for designated use assessment by DES (Table 3). Lower Newfields Brook and Lower Grafton Brook feed into Hodgson Brook which, in turn, empties into North Mill Pond. Unfortunately, these three assessment units do not accurately represent the complete surface hydrology of Hodgson Brook.

It is recommended that DES add two more assessment units to provide a comprehensive assessment of the Brook's uses. The added segments are Newfields Ditch and the Borthwick Avenue tributary (Table 4). The first tributary in need of an assigned assessment identification number is Newfields Ditch which flows easterly and feeds into Lower Newfields Brook at the intersection of Rye Street and Corporate Drive.

The second unassigned tributary is the segment of Hodgson Brook in the Borthwick Avenue area. This tributary flows parallel to Borthwick Avenue and connects with the lower portion of Hodgson Brook downstream from the Grafton Ditch and Lower Newfields Brook confluence. The Borthwick Avenue tributary conveys stormwater from the Portsmouth Regional Hospital and surrounding businesses and drains a large wetland complex.

**Table 3 Present Assessment Unit Names and IDs**

| Existing Assessment Unit Name | Assessment Unit ID |
|---|---|
| Hodgson Brook | NHRIV600031001-04 |
| Lower Newfields Brook (Hodgson Brook) | NHRIV600031001-05 |
| Lower Grafton Brook | NHRIV600031001-06 |
| North Mill Pond | NHEST600031001-10 |

**Table 4 Proposed Additional Assessment Units**

| Proposed Assessment Unit Name | Possible Assessment Unit ID |
|---|---|
| Newfields Ditch | NHRIV600031001-07 |
| Borthwick Avenue Tributary | NHRIV600031001-08 |

Another unassigned section is Upper Hodgson Brook which flows from the northwest corner of the Pease Tradeport down to the northernmost assessed section of Hodgson Brook currently named Lower Newfields Brook. While the uppermost segment of Hodgson Brook does not currently have its own Assessment Unit ID and this is not recommended, a sampling station could be set up at the point just upstream of its confluence with Newfields Ditch that would accurately reflect the conditions of the upper section. Table 5 shows possible sampling stations and GPS coordinates for corresponding existing and proposed assessment units.

## 1.3 Sampling Locations

The proposed sampling locations for Hodgson Brook are listed in Table 5. Sites include six instream locations at various sites along the brook (Appendix A). Sampling sites were selected just upstream of intersecting tributary segments so that accurate representations of each segment could be achieved. All segments of the Brook will be monitored for parameters that determine aquatic life, primary contact recreation, and secondary contact recreation uses through involvement in the Volunteer River Assessment Program and reliance on the DES Biological Assessment Program.

**Table 5 Proposed Sampling Locations**

| Station ID | Station Name | Latitude | Longitude |
|---|---|---|---|
| HB040 | Upper Hodgson Brook | 43.0821 | -70.7962 |
| HB030 | Newfields Ditch | 43.0819 | -70.7963 |
| HB020 | Middle Hodgson Brook | 43.0748 | -70.7853 |
| HB010 | Grafton Ditch | 43.0740 | -70.7874 |
| HB050 | Borthwick Ave Tributary | 43.0713 | -70.7830 |
| GBCW-19 | Lower Hodgson Brook[1] | 43.0713 | -70.7727 |

Note 1: GBCW-19 should be sampled on an ebbing tide only to avoid any mixing of the brook with water from North Mill Pond

## 1.4 Monitoring Requirements to Assess Each Designated Use

It is recommended that assessments for each AU occur every two years. The following three tables (Tables 6, 7 and 8) list the recommended monitoring parameters and frequency to meet the 2-year assessment cycle. The three uses that will be assessed by DES are primary and secondary contact recreation and aquatic use.

Primary contact recreation will be assessed through sampling for the bacterial indicator *Escherichia coli* (*E. coli*), discharges of untreated sewage, evidence of algal blooms, water color or the presence of foam, debris, scum, slicks, odors, and surface floating solids. Bacterial indicators and discharges of untreated sewage information also serve as use support indicators for secondary contact recreation. It is suggested that illicit discharge surveys be conducted in the watershed (see Section 2).

Aquatic life use will be assessed through dissolved oxygen, pH, and flow (discharge) data collected through the VRAP monitoring. DES staff will conduct biological and

habitat assessments through the DES Biological Monitoring Program in accordance with a rotating schedule. All of these parameters are considered indicators of aquatic life use.

**Table 6 Primary Contact Recreation Assessment Monitoring**

| Primary contact recreation | | |
|---|---|---|
| Indicator # | Indicator(s) | Recommended monitoring |
| 1 | Beach closures or restrictions | Not applicable due to no swimming beaches along the Brook. |
| 2 | Bacteria | A minimum of 5 *E. coli* samples collected between 5/24 and 9/15. |
| 3 | Discharges of Untreated Sewage | Conduct illicit discharge and detection survey (see Section 2.4) |
| 4 | Chlorophyll-a | Chl-a sample collection not offered through VRAP and not recommended at this time. Notes will be made on the field data sheet if there is evidence of an algal bloom. |
| 5 | Various indicators | Record water color and the presence of any of the following on the field data sheet: algal bloom, foam, debris, scum, slicks, odors, and surface floating solids. |

**Table 7 Secondary Contact Recreation Assessment Monitoring**

| Secondary contact recreation | | |
|---|---|---|
| Indicator # | Indicator(s) | Recommended monitoring |
| 1 | Bacteria | A minimum of 5 *E. coli* samples collected between 5/24 and 9/15. |
| 3 | Discharges of Untreated Sewage | Conduct illicit discharge and detection survey (see Section 2.4) |
| 3 | Obstructions to Boating (Navigation) | Not applicable due to Brook not navigable by motorized craft. |

**Table 8 Aquatic Life Assessment Monitoring**

| Aquatic Life | | |
|---|---|---|
| Indicator # | Indicator(s) | Recommended monitoring |
| 1 | Dissolved oxygen | A minimum of 5 measurements taken during the 6/1 through 9/30 time period collected between 5:00 and 8:00 AM. |
| 2 | pH | Collected at the same interval as dissolved oxygen. |
| 3 | Biological Assessments | Rely on DES Biological Monitoring Program. |
| 4 | Habitat Assessments | Survey completed during DES Biological Monitoring work but can also be supplemented through volunteer surveys. |
| 5 | Toxic substances in ambient water | Not recommended based on expense and reliance on biological assessments. |
| 6 | Toxicity Tests of the Ambient Water | Not recommended based on expense and reliance on biological assessments. |
| 7 | Sediment Quality | Not recommended based on expense and reliance on biological assessments. |
| 8 | Exotic Macrophytes | Conduct survey of exotic macrophytes through the DES Weed Watcher Program. |
| 9 | Flow | Monitor flow conditions to determine base and stormwater discharge. Monitor gauges on a monthly basis and during a range of storm events. |
| 10 | Benthic Deposits | Record the presence of benthic deposits on the field data sheet during routine monitoring. |

# Section 2 Recommended Monitoring Program

The monitoring plan design is made up of two basic types of monitoring approaches: routine sampling and special studies. Justification for the design is discussed and an outline of the components of each approach is provided.

There are several different monitoring techniques or "indicators" that watershed managers can use to assess the performance of a watershed management plan (Caraco et al., 1998). Environmental indicators are direct or indirect measures that indicate trends or responses in receiving waters (Schuler and Holland, 2000). Monitoring programs are often constrained by costs and staff resources. To minimize the strain on resources, managers often use environmental indicators to characterize overall or specific conditions in receiving waters and to provide a benchmark for assessing the success of management strategies (Schuler and Holland, 2000).

While Caraco et al. (1998) note that much past research has focused on urban runoff pollution, adverse effects on receiving water quality, and the pollutant removal capacity of stormwater best management practices (BMPs), much of these data (i.e., pollutant concentrations, source area loads, and removal rates) can be generalized and transferred to almost any watershed. Even so, long term monitoring specific to a subwatershed is needed to identify specific problem areas and to assess the performance of subwatershed management efforts.

## 2.1 Volunteer River Assessment Program

DES offers two volunteer programs for monitoring water quality. The two programs are the Volunteer Lake Assessment Program (VRAP) and the Volunteer River Assessment Program (VRAP). Each program offers volunteers training, equipment and data management and reporting support. DES staff assist volunteers with sampling program design and data interpretation. These valuable programs serve to educate community volunteers about their water resources and augment the DES information and data for State surface waters. Participation in VRAP is recommended.

### 2.1.1 Rationale

Participation in the Volunteer River Assessment Program is a practical way to achieve the monitoring goals. VRAP offers a monitoring program that is user-friendly and data rich. Equipment is loaned out or a group can purchase the necessary field meters. Training sessions are provided. And, VRAP publishes an annual report for each participating group that shows the results in tabular and graphic formats.

### 2.1.2 Station Locations

The six sampling station locations for VRAP monitoring are listed in Table 5 and shown in Appendix A. Each location is new except for the site situated at the mouth of the Brook, GBCW-19. This station at the mouth of the Brook must be monitored during ebbing tides to avoid collecting brackish water from the North Mill Pond.

### 2.1.3 Sampling Technique

Field measurements for dissolved oxygen, temperature, pH, specific conductivity and turbidity are recommended by the VRAP protocols. Several VRAP groups also collect samples for bacterial indicator (*E. coli*) analysis. The laboratory at DES is available to analyze samples for bacteria at a cost. Use of a local laboratory such as a lab at a wastewater treatment plant is also permissible and encouraged.

### 2.1.4 Frequency

Field measurements of dissolved oxygen, pH, temperature, conductivity, turbidity, and field observations should be conducted during scheduled sampling runs. Volunteers will contact the DES VRAP Coordinator at the beginning of the sampling season to relay the sampling dates for the season. Table 9 lists the recommended indicators and frequency. Sample collection for *E. coli* analysis will occur at the same time as the field measurements. The presence of various indicators will be noted on the field data sheet (Appendix B). These indicators include water color, algal blooms, foam, debris, scum, slicks, odors, surface floating solids and benthic deposits. Benthic deposits are defined as sludge, sediment or other organic or inorganic accumulations on the bottom of the surface water.

VRAP also offers the use of in situ meters for measuring dissolved oxygen, temperature and specific conductance (also known as conductivity). Generally, the DES VRAP staff assist volunteers in the deployment and retrieval of the meters which are left in the water for three to four days at a time. The data collected are used to determine daily averages for dissolved oxygen saturation which helps assess if standards are being met. In addition, by measuring specific conductance before, during and after a rain event the potential presence of pollutants such as chlorides, nitrates and phosphates could be determined.

Flow data will be collected on a monthly basis and after various rain events. See Section 2.2 for more details regarding flow monitoring. Sample collection sould be conducted in accordance with the VRAP sampling protocol and other DES or EPA approved methods.

**Table 9 Volunteer River Assessment Program Monitoring**

| Volunteer River Assessment Program (VRAP) | | |
|---|---|---|
| Indicator # | Indicator(s) | Recommended monitoring |
| 1 | Dissolved oxygen | A minimum of 5 measurements taken during the 6/1 through 9/30 time period collected between 5:00 and 8:00 AM. |
| 2 | pH | |
| 3 | Temperature | |
| 4 | Turbidity | |
| 5 | Specific conductance | |
| 6 | *E. coli* | A minimum of 5 measurements taken during the 5/24 through 9/15 time period. |
| 7 | Flow measurements | Collect discharge data from at least one location on a monthly basis and following rain events. If only one station is set up it should be located at the mouth of the Brook. |
| 8 | Exotic Macrophytes | Conduct survey in June or July. |

Modifications and additions to VRAP protocols include (1) modifications to the backside of the field data sheet to include the "various indicators" listed in Table 6 and benthic deposits, (2) flow (discharge) data collection, and (3) exotic macrophyte surveys. A modified field data sheet is in Appendix B.

Biological assessments will be conducted by the DES Biomonitoring Program staff. If the funding for the DES Volunteer Biological Assessment Program is restored, volunteers could participate in the biological assessments and even augment the biological DES data collection.

As a quality control measure, samplers would collect duplicate samples and field measurements at a minimum rate of 10% of the total samples and measurements in accordance with the VRAP Quality Assurance Project Plan.

### 2.1.5 Data Management and Reporting

The volunteer monitoring data are submitted to DES for interpretation and discussion. The hardcopy field data sheets are submitted to DES. DES staff enter the information into the Environmental Monitoring Database. An annual report is issued to each group participating in VRAP. Data are available on the DES OneStop website after quality control checks are completed. DES will evaluate Hodgson Brook for the designated uses described in the *Consolidated Assessment and Listing Methodology* and work with the local groups to develop recommended measures to remedy any impairments.

## 2.2 Flow Monitoring

There are three objectives for collecting stream flow (also called discharge) information from Hodgson Brook. The first reason for collecting flow information is related to determining the effects of urbanization on stream flows. The second reason is that use of stream flow and pollutant concentration data allows for calculation of pollutant loading. This type of information is necessary for assessing the significance of pollutant sources on ecosystem quality. The third reason for collecting stream flow data is to determine whether the Brook has enough water to support particular fish species, some of which require seasonal high flows.

Measuring flow will involve establishing a rating curve, also known as a stage discharge curve. A rating curve plots stream height (stage) against flow (discharge) under different flow conditions. Once established, the rating curve can be used to convert simple measurements of stream height to flow without the need for measuring velocity (EPA, 2003). It is also suggested that a combination staff gauge/crest gauge be used because it not only serves as a staff gauge but also preserves a record of maximum stream height (crest).

### 2.2.1 Rationale

Flow data will help in the interpretation of water quality data. Often information about stream conditions at the time flow measurements are taken provides critical clues to help volunteer monitors answer their bottom line question: "What do these results mean?"

(EPA, 2003). Basically, flow measurements provide a basis for understanding the dynamic nature of the Brook water and its response to meteorological influences.

### 2.2.2 Station Location

Flows can be measured at each site where the water quality measurements are made; however, the site located at the mouth of the Brook should be monitored at a minimum. The sampling station at the mouth is GBCW-19. Other sampling sites can be monitored as resources allow.

### 2.2.3 Sampling Technique

Velocity will be measured using a current meter with an electronic sensor (e.g., meters made by Marsh McBirney, Sigma, or SonTek). Because flow will be different at different points along a cross section, multiple measurements will be made. A measuring tape will be stretched across the stream and the operator will wade alongside the tape, measuring depth and velocity at regular intervals while being careful to stand downstream and to the side of the meter. The meter needs to be properly positioned, about two thirds deep within the water column, to obtain a representative reading because water velocity varies with depth, generally being highest at the surface and lowest at the bottom. For most streams, measurements are made at 25 to 30 intervals across the stream. Each interval defines a rectangle with an area defined by the width (read from the measuring tape) times the depth. The flow, in cubic feet per second (cfs), for each rectangular subsection will be calculated by multiplying its area (square feet) times velocity (feet/second) measured at that point. Finally, the flows for the individual subsections will be summed to obtain the flow for the whole cross section (EPA, 2003).

EPA (2003) mentions that some volunteer monitoring groups simplify the method- for example, by taking measurements at 1-foot intervals across the stream. This modification, and possibly others, should be considered based on site constraints.

Velocity will be reported as feet/second, stream depth as feet and tenths of feet; and flow as cfs. After a rating curve is developed by making a number of flow determinations under different conditions, the volunteers will only need to record stream height (or water depth) from the stream gauge on ensuing sampling dates. To determine the flow for a given stream height, the rating curve can be used to read off the corresponding value for the flow. Finally, the rating curves need to be based on a full range of expected flow conditions, so measurements will be required under the lowest and highest stage conditions. This means that some flow measurements will most likely be made outside the VRAP monitoring of water quality parameters in order to measure varying levels of discharges.

### 2.2.4 Frequency

Flow measurements made to determine the rating curve should be made under a variety of conditions, including when the stream depth is high under high flow conditions, and when depth and flow are lowest (EPA, 2003). Stream gauge readings should be taken at the same time water quality measurements are made and samples are collected. Crest gauge readings should be taken after storm and snow melt events to provide a second source of flow data.

Water sampling and flow measurements made on predetermined sample dates will probably capture lowest stage conditions because of the emphasis on summertime sampling in VRAP. However, it will not ensure making flow measurements during the highest stage conditions. Extra work beyond the routine monitoring may be needed to capture this critical information. A storm event during spring, when flows generally are highest, will be targeted based on weather forecasts. Monitors will conduct extra sampling to include both flow measurements and sample collections, during the targeted storm event.

And finally, volunteer monitors could consider regular staff gage readings during high flow seasons to determine suitability for various fish species. The NH Fish and Game Department should be consulted for appropriate timing of the readings.

### 2.2.5 Data Management and Reporting

All raw flow and quality assurance data will be entered into MS Excel spreadsheets and verified according to standard methods of verification. Data will be reviewed and organized into data reports and then integrated into an annual comprehensive monitoring report for the Hodgson Brook monitoring program. Flow data will be used to calculate pollutant loading rates for bacteria and, possibly, determine if seasonal high flows meet the needs of certain fish species.

## 2.3 Weed Survey

The DES Weed Watcher Program provides training and guidance to volunteers interested in keeping watch for invasive and exotic weeds. This no-cost program involves periodic monitoring, typically of near shore, shallow lake environments, for new infestations of nuisance, exotic weeds. Early detection of weeds in a lake environment, especially fast-growing exotic species such as milfoil, can prevent the weed from spreading if quick action to eradicate the weed is taken. The DES Weed Watcher Coordinator is willing to modify the program to adapt the survey materials for a stream environment.

### 2.3.1 Rationale

DES uses the presence of exotic weeds as an indicator of an impaired aquatic environment. Some aggressive exotic weeds take over environments and result in a vegetative monoculture, often making access to cover and food source difficult for animals. The survey information will be used to help make assessment decisions for aquatic life use in each assessment unit.

### 2.3.2 Station Location

Surveys will be conducted in each assessment unit as access and safety allow.

### 2.3.3 Sampling Technique

The surveys will be conducted in accordance with the Weed Watcher Program standard procedures. Some modifications will be made by the Program Coordinator to adapt the procedures for use in a stream environment.

### 2.3.4 Frequency

The first survey will be conducted in June or July under the direction of the Weed Watcher Program Coordinator. Surveys will occur on annual basis or as recommended by the Program Coordinator.

### 2.3.5 Data Management and Reporting

The presence of exotic weeds will be documented on a map and the species and extent of distribution will be measured. The information will be reported to the DES Weed Watcher Program Coordinator.

## 2.4 Illicit Discharge Detection Survey (Stormwater Outfall Survey)

Dry weather discharges from storm drainage systems were identified as potential sources of several priority pollutants in the Hodgson Brook watershed (Morin and Jones, 2003). DES has identified numerous dry weather discharges in the urban and suburban areas of New Hampshire coastal communities. Many of these discharges were found to be sewer connections to the storm drainage system and monitoring showed elevated bacteria levels discharging from these storm drain outfalls into surface waters.

DES has found that older urban and suburban buildings occasionally have sewer lines mistakenly, and sometimes intentionally, connected to the storm drainage system. DES has also found newer buildings with illicit discharges but at a much lower frequency. Most communities have ordinances that address these illicit connections and require the sewer lines to be redirected to the sewer infrastructure, which eventually flows to wastewater treatment facilities.

Conducting dry weather discharge surveys is a tool used by many communities to identify illicit discharges. The New England Interstate Water Pollution Control Commission (NEIWPCC) has published a guide for conducting surveys of storm drainage systems. EPA's Storm Water Phase II rules require certain communities, including Portsmouth, to conduct illicit discharge detection and elimination control measures. The first step in implementing this control measure is the creation of a storm drainage system map, also know as a storm sewer system map. Portsmouth has completed a storm sewer system map that includes the Hodgson Brook watershed.

### 2.4.1 Rationale

Illicit discharges into storm drainage systems have been documented in New Hampshire coastal communities. Several illicit discharges and cross connections (sewer and storm drain lines crossing through infiltration and exfiltration) have been identified in the North Mill Pond watershed. Since the lower portion of the Hodgson Brook watershed

has aging infrastructure and older buildings, a survey of dry weather discharges is recommended in at least the lower watershed neighborhoods and commercial areas.

### 2.4.2 Station Locations

The dry weather discharge surveys should be conducted throughout the watershed, with a priority on the lower watershed, including the Pannaway Manor neighborhood, Rt. 1-Bypass businesses, and the neighborhoods east of the Rt. 1-Bypass.

### 2.4.3 Sampling Technique

The survey methodology is provided in the NEIWPCC *Illicit Discharge Detection and Elimination Manual: A Handbook for Municipalities*. It is recommended that monitors meet with the City of Portsmouth Department of Public Works (DPW) to determine the best course of action for this survey. In addition to the storm sewer maps, the DPW may have other information about the storm drainage systems. DES has some information about the discharge pipes between the mouth of Hodgson Brook and the Rt. 1-Bypass and most of this information has been incorporated into the City's maps.

The general course of action for the survey is as follows:

A. Meet with the City of Portsmouth Department of Public Works
B. Obtain storm sewer maps from the City
C. Prioritize areas for the survey
D. Use available information to identify potential "hot spots"
E. Conduct dry weather screening to look for non-stormwater discharges
F. Conduct water quality testing to see if these non-stormwater discharges seem to be illicit discharges using optical brighteners or bacterial indicators
G. Trace the source of the illicit discharge
H. Working with the City, remove the source of the illicit discharge
I. Conduct follow up monitoring to ensure source has been removed

Water samples will be taken from areas identified as having illicit discharges. Sample collection should include a minimum of one water sample from each non-stormwater discharge identified during the survey. A maximum of seven water samples should adequately characterize the discharge.

### 2.4.4 Frequency

Repeat survey in accordance with the City of Portsmouth plan for illicit discharge and detection surveys or at least every three years. Follow-up sampling and testing should occur at sites where sources have been found and eliminated.

### 2.4.5 Data Management and Reporting

A map should be generated to include the locations of illicit discharges within the watershed. All raw data for dry weather conditions will be entered into MS Excel spreadsheets and verified according to standard methods of verification. Data will be

organized into data reports and published in an annual report. Sites will be organized into assessed sites with bacterial levels of concern and those of no concern.

## 2.5 Trash and Debris Survey

Morin and Jones (2003) reported that trash and debris were issues in North Mill Pond and Hodgson Brook. The Advocates for the North Mill Pond sponsor annual clean ups which have yielded five tons of garbage in 1997, filled an 8-cubic yard dumpster in 2001 and another dumpster was filled in 2002 that included large items such as sleeping bags and kitchen stoves. Despite both the City of Portsmouth and DES protecting against illegal dumping and filling, and the Department of Transportation removing trash from highways on an annual basis, the amount of trash removed from the area seems to be increasing.

A trash survey has already been developed in California and could serve as a useful model for the Hodgson Brook watershed. The California Regional Water Quality Control Board, Surface Water Ambient Monitoring Program designed a rapid trash assessment for wadeable streams. The rapid trash assessment can be used for a number of purposes such as ambient monitoring, evaluation of management actions, or comparing sites with and without public access (CRWQCB, 2002). The rapid trash assessment includes a range of parameters that capture the breadth of issues associated with trash and water quality. The trash assessment parameters and the focus of each parameter are listed below.

**Table 10 Trash Assessment Parameters**

| Trash Assessment Parameter | Parameter Focus |
|---|---|
| Level of Trash | Qualitative levels of trash |
| Actual number of trash items found | Quantitative levels of trash |
| Threat to aquatic life | Estimate actual threat to water quality |
| Threat to human health | Estimate actual threat to water quality |
| Illegal dumping and littering | How trash enters the waterbody |
| Accumulation of trash | How trash enters the waterbody |

### 2.5.1 Rationale

Trash is a documented issue in the watershed and can affect humans, fish, and wildlife in a number of adverse ways. The rapid assessment methodology was designed to reflect the range of trash impacts and evaluate the effects of trash on water quality. Volunteers can use the assessment to monitor ambient conditions and document the effects of episodes that affect trash levels such as storms and community clean up events.

### 2.5.2 Station Locations

The trash and debris survey should be conducted both on the roads and in the stream for all areas in the watershed.

### 2.5.3 Sampling Technique

The rapid trash assessment methodology developed by the California Regional Water Control Board, San Francisco Bay Region, provides the survey protocols and a three-page field worksheet. These materials can be easily adapted to the Hodgson Brook watershed with only minor changes.

### 2.5.4 Frequency

The CRWCB protocols suggest surveying a given site several times during different seasons in a given year to characterize the variability and persistence of trash occurrence for water quality assessment purposes. The trash surveys will be completed once during spring, summer and autumn. It is not advisable to conduct surveys during the winter months in New Hampshire. Additional surveys will be conducted after community cleanups to monitor the affects of the management actions.

### 2.5.5 Data Management and Reporting

Scores are assigned to the six trash categories and totaled. The total scores for each site (as defined on the worksheet) should be kept in a database/spreadsheet and compared to the other sites over time. The assessments should be sent to the City of Portsmouth Departments of Public Health and Public Works, NHDOT and DES.

## 2.6 Programmatic Indicators Monitoring

It is recommended that additional "programmatic" indicators that do not require stream sample collection but are important in assessing the changes in the watershed should also be tracked. Programmatic indicators gage program success through results from quantitative analyses of program initiatives, such as the number of permits issued or inspections conducted for a given program element. Programmatic indicators do not provide specific measurements of waterbody health, but can provide valuable information about potential impacts or program effectiveness (Schuler and Holland, 2000). The suggested supporting variables are listed below.

Number of Wetlands and Site Specific Permit violations in the watershed

Number of reported National Pollution Discharge Elimination System violations from stormwater discharges

Number of reported discharges of raw or partially treated wastewater

Number of illicit discharges identified and eliminated

### 2.6.1 Rationale

Programmatic indicators are chosen as supplements to field measurements because they provide a practical application of the water and environmental quality of the watershed beyond data collected in the field. They also are a means by which environmental mangers can measure management action progress. The technical characterization report (Morin and Jones, 2003) summarized permit violations within the

Hodgson Brook watershed, including those for wetlands, stormwater discharges and treated wastewater. Specific types of violations cited were as follows:

A. Wetlands and Site Specific Permit Violations

The findings of the technical report indicate that soil movement from construction and development sites into surface waters is a problem in the watershed. The frequency of enforcement of state regulations can be an indicator of improved/worsening implementation of erosion and sediment control BMPs at developing sites. DES tracks violations and enforcement actions for wetlands and surface waters in state jurisdiction.

B. NPDES Violations from Stormwater Discharges

Exceedences of permit limits for the five NPDES regulated stormwater discharges in the Pease Tradeport were mentioned in the technical report.

C. Reported Discharges of Raw or Partially Treated Wastewater

Raw or partially treated sewage poses a health risk to users of the Brook and its receiving water, North Mill Pond. Infrequent discharges have been reported at the Pease wastewater treatment facility which is operated by the City of Portsmouth.

D. Number of Illicit Discharges Identified and Eliminated

Dry weather discharges from storm drains have been studied in other areas of Portsmouth and the seacoast. Several illicit discharges have been identified in the North Mill Pond watershed. The presence of illicit discharges is a typical occurrence and poses a threat to users of the Brook and North Mill Pond.

### 2.6.2 Data Sources

The sources for data on the different types of permit violations are as follows:

A. Wetland and Site Specific Violations

The DES Pease Field Office maintains records of Wetlands and Site Specific enforcement cases.

B. Reported NPDES Violations from Stormwater Discharges

The Pease Development Authority (PDA) and the DES Wastewater Engineering Bureau maintain monthly records of stormwater discharge monitoring. The PDA collects monthly surface water samples from five sites (Hodgson Brook, Flagstone Creek, McIntyre Brook, Harvey's Creek, and the wastewater treatment plant) in the Pease Tradeport after a qualifying rain event begins (>0.1 in., ≥72 h. after previously measurable precipitation event). Samples are analyzed for biological oxygen demand (BOD), surfactants, oil/grease, iron, zinc, lead, nickel, and cyanide.

C. Reported Discharges of Raw or Partially Treated Wastewater

The City of Portsmouth submits a report to both the DES Shellfish Program and the Wastewater Engineering Bureau in the event of a discharge of raw or partially treated wastewater at the Pease wastewater treatment facility.

D. Number of Illicit Discharges Identified and Eliminated

The Illicit Discharge Detection Survey will provide the data necessary to identify illicit discharges, if any exist, in the Hodgson Brook watershed. The City of Portsmouth and DES already have records of illicit discharge connections identified and eliminated in the immediate shoreline of North Mill Pond. Dry weather bacterial loading information of the events around North Mill Pond is kept on file at DES. These records identify areas under investigation by DES. Any new illicit connections identified through implementation of the Hodgson Brook monitoring plan will be reported to DES and the City of Portsmouth.

### 2.6.3 Analyses Techniques

Data will be collected from the listed sources, and any new sources that may arise. The data will be analyzed by determining data that constitute violations and counting these incidences over a year's time. The specific analyses for the different types of violations are as follows:

A. Wetlands and Site Specific Permit Violations

The number of wetlands and site specific violations per year compared to the previous years. The number of exceedences will be determined for each site, and comparisons made with time to annually summarize databases. Comparison of site locations will allow for evaluating if violations are occurring at new sites or the same sites.

B. Reported NPDES Violations from Stormwater Discharges

The number of violations per year compared to previous years.

C. Reported Discharges of Raw or Partially Treated Wastewater

The number of complaint reports submitted to DES per year compared to the previous years.

D. Number of Illicit Discharges Identified and Eliminated

The number of illicit discharges, defined as a discharge from a building, identified per year and the number of fixes occurring each year. Site locations of violations will be noted to determine which sites have long term problems and where new problems are identified.

### 2.6.4 Data Management and Reporting

All data will be entered into MS Excel spreadsheets and verified according to standard methods of verification. Data will be organized into data reports which will be comprehensive for all components of the Hodgson Brook monitoring program. Data reports will be published on an annual basis.

## Section 3 Special Studies

The following studies are recommended as supplements to the baseline monitoring program. These studies involve surveys that can be completed by or partially involve

volunteer monitors. Each of the studies addresses data gaps identified in the technical report (Morin and Jones, 2003).

## 3.1 Stormwater Retrofit Opportunity Survey

Stormwater retrofits are designed to help to control stormwater runoff and the adverse impacts associated with runoff. The retrofits are designed to minimize accelerated erosion, reduce pollutant loads, and promote conditions for improved aquatic habitat (Clayton, 2003). In short they are best management practices which are typically used in urban landscapes when prior stormwater controls exist (Clayton, 2003). They can accompany other monitoring and restoration strategies already existing in a watershed. They can help to establish a stable, predictable hydrologic water system which is important for restoring a stream's health. In fact the Center for Watershed Protection (CWP) claims that in order to successfully restore a stream's overall aquatic health, stormwater retrofits are an essential element.

The CWP has designed an eight-step approach to stormwater retrofitting for environmental managers to use.

**Table 11 Basic Elements of a Stormwater Retrofitting Implementation Strategy**

| Step | Elements | Purpose |
|---|---|---|
| 1 | Preliminary Watershed Retrofit Inventory | First cut at identifying potential retrofit sites |
| 2 | Field Assessment of Potential Retrofit Sites | To verify that sites are feasible and appropriate |
| 3 | Prioritize Sites for Implementation | To set up a priority for implementing future sites |
| 4 | Public Involvement Process | To solicit comments and input from the public and adjacent retrofits on potential sites |
| 5 | Retrofit Design | To prepare construction drawings for specific facilities |
| 6 | Permitting | To obtain the necessary approvals and permits for specific facilities |
| 7 | Construction Inspections | To ensure that facilities are constructed properly in accordance to the design plans |
| 8 | Maintenance Plan | To ensure that facilities are adequately maintained |

### 3.1.1 Rationale

The eight-step approach is best used to control sedimentation, erosion and flow conditions while reducing impacts from pollutants. The technical report identified sediment as a source of contamination to the Brook since it can degrade surface water quality. Sediments are considered threatening because they can smother surface habitats and act as a vector for microbes and as a reservoir for pollution. The eight-step approach would be the means by which managers could control the impact of sedimentation and erosion in the Hodgson Brook watershed, as well as slowing down the volume of water which flows from impervious surfaces into stormwater infrastructures and on into the Brook.

### 3.1.2 Station Locations

The eight-step approach to stormwater retrofitting should be applied throughout the watershed. Sites should include stormwater outfall locations identified by the City of Portsmouth storm drainage system infrastructure maps.

### 3.1.3 Sampling Technique

The eight-step approach for stormwater retrofitting developed by CWP provides an example strategy to retrofit stormwater runoff infrastructure and provides model case studies which have successfully used retrofitting. These materials can be used to develop a retrofitting plan for the Hodgson Brook watershed. Reconnaissance of the watershed in a car and on foot can identify retrofit candidate sites. CWP gives some examples for retrofit locations that could be used as possible retrofit candidate sites in the Hodgson Brook watershed and they include: existing stormwater detention facilities, immediately upstream of existing road culvert, immediately below or adjacent to existing stormdrain outfalls, directly within urban drainage and flood control channels, and within or adjacent to large parking lots. Concept sketches should be made at each potential site and reviewed by the City of Portsmouth. Once retrofit sites are chosen the drainage area of the retrofit must be calculated. Then a stormwater retrofit implementation strategy must be established and a scoring system to rank retrofit sites created. Retrofit designs should be reviewed by the City of Portsmouth. CWP suggests regular maintenance, inspections, and continued public education through the duration of the retrofit plan.

### 3.1.4 Frequency

Since construction and development will continue to occur, surveys should be conducted at a five year frequency.

### 3.1.5 Data Management and Reporting

All retrofit design sketches should be kept on file and retrofit capture area calculations and retrofit scores should be put into a database. Retrofit scores will be based on a scoring system. Retrofit data will be organized into data reports and be made available to the Public Works staff and any others interested in installing retrofit structures. Data reports should be integrated into the comprehensive report for the Hodgson Brook monitoring program.

## 3.2 Microbial Source Tracking Survey

Microbial source tracking (MST) surveys include a variety of methodologies to identify sources of bacterial contamination. Researchers at the University of New Hampshire have established a specialized laboratory for a microbial source tracking method called ribotyping. Ribotyping involves matching the DNA fingerprints of bacteria in surface water to a library of fingerprints in the UNH ribotyping database. UNH has successfully identified the bacteria sources in several coastal areas, including Hampton/Seabrook Harbor. An MST study of Hampton/Seabrook Harbor found the relative percentages of human and wildlife bacteria were greater than other identified sources which included pets, livestock, and birds (Jones and Landry, 2003). The method

can also be used to identify actual source species at specific pollution sources like storm drains. In a study in Hampton and Seabrook, water samples from two storm drains were collected during a large storm event and source species determined (Jones, 2003). Birds were found to be the most significant source of *E. coli* in both pipes, with humans also a significant source.

Ribotyping is an effective tool for tracking the sources of bacterial contamination but is relatively expensive. Typically, other tools are used prior to employing ribotyping to save resources and to help focus use of ribotyping only where source identification is not otherwise possible. For example, if identification and elimination of pollution sources through illicit discharge detection surveys does not result in significant water quality improvements, ribotyping can be used for identifying what sources are actually causing pollution.

Another strategy is to use ribotyping at the beginning of the watershed assessment to focus follow-up monitoring and restoration, and then use it again to assess the impacts of management activities.

If the baseline monitoring shows elevated bacterial levels after the illicit discharge detection and elimination programs are completed, ribotyping should be considered. At that time, a field sampling design should be developed in consultation with UNH. The sampling program should target the subwatersheds that show elevated bacterial concentrations that exceed state standards for freshwater recreation (e.g., sample not to exceed an *E. coli* level of 406 cts/100 ml). An intensive targeted sampling design should address the conditions (for example low flow, autumn, dry weather) where the data show bacterial pollution impacting Hodgson Brook.

### 3.2.1 Rationale

There are two reasons for considering ribotyping special projects for the Hodgson Brook watershed. In both cases, ribotyping will be used in conjunction with an intensified assessment using water quality measurements of *E. coli* concentrations. The first case would depend on the results of *E. coli* measurements made as part of the baseline monitoring program. If *E. coli* concentrations are found to be elevated (consistently above state standards) at a monitoring site, or under a given set of conditions (high or low flow, season), then follow up sampling will be conducted and ribotyping used to identify the most significant source(s) of the contamination. The other case is if bacterial levels remain elevated in the discharges from stormwater outfalls after the illicit discharge detection and elimination special project is completed. In both cases, the results of the ribotyping analyses would direct follow up measures to identify and eliminate the pollution sources that cause the water quality degradation.

### 3.2.2 Station Locations

As data from the routine water quality field monitoring program becomes available, sampling sites will be targeted for ribotyping analysis if found to have high bacterial contamination levels. In addition, if water quality in stormwater outfalls does not improve after completion of the illicit discharge detection survey, then those problem sites will also be targeted for ribotyping. Finally, some outfalls may be targeted for ribotyping

under wet weather conditions if they are suspected to be degrading water quality at routine monitoring sites.

### 3.2.3 Sample Technique

Sampling procedures for water collection are as described in Jones and Bryant (2002). Basically, an extra water sample for *E. coli* analysis will be collected and transported to the Jackson Estuarine Laboratory (JEL) for analysis and isolation of strains for ribotyping with a RiboPrinter©. The identification of source species for *E. coli* isolates from water samples will be determined using the existing source species library at JEL. If sampling during storm events is required, then protocols developed by DES should be followed for the timing of sampling and supporting flow measurements (Trowbridge, 2003).

### 3.2.4 Frequency

The frequency of sample collection for ribotyping will depend on the conditions under which unresolved water quality problems are identified. If the problems are associated with either seasonal or meteorological conditions at routine sites, then the frequency would be once during the problematic condition as part of the routine monitoring. If the targeted site is a stormwater outfall, then the sampling will require one sample collection under dry weather or storm event conditions, depending on the identified problematic condition.

### 3.2.5 Data Management and Reporting

Identification of source species for water sample patterns will be based on matches that have ≥90% similarity to known species patterns (Jones and Landry, 2003). Data will be analyzed with GelComparII software and ribotyping patterns and similarity coefficients will be interpreted by UNH personnel.

Data will be organized into data reports and interpreted by UNH based on ribotyping, *E. coli* concentrations and previous measurements that were the basis for defining the problem.

# Section 4 Monitoring Logistics

## 4.1 Monitoring Cycle

The monitoring plan is designed to provide data to assess uses for each assessment unit on a 2-year cycle. The designated uses that will be monitored for are aquatic life, and primary and secondary recreation uses. The other components of the plan fill data gaps previously identified (Morin and Jones, 2003) and provide additional means for tracking progress of management activities. Two special studies are suggested to further fill the data gaps and meet the management goals for Hodgson Brook.

**Table 12 Baseline Monitoring Timetable**

| Monitoring Activity | Routine Seasonal Monitoring | Annual Survey | Additional Monitoring |
|---|---|---|---|
| VRAP (water quality) | x | | |
| Flow (discharge) | x | | Rain Events |
| Weed Survey | | x | |
| Illicit Discharges Survey | | x | |
| Trash & Debris Survey | | x | |
| Programmatic Indicators | | x | |
| Biological Assessments | To be completed by DES in accordance with the Biological Monitoring Program schedule | | |
| Habitat Monitoring | To be completed by DES in accordance with the Biological Monitoring Program schedule | | |

## 4.2 Coordination and Quality Control

A staff person is needed to recruit and train volunteers, manage data and information, and report on the monitoring programs. The monitoring coordinator is expected to compile data from all monitoring surveys into an annual report. An annual water quality report is produced by VRAP. Information from the VRAP report can be used in summary format in the annual monitoring report. If EPA funds are used for monitoring activities, a quality assurance project plan (QAPP) will have to be created for those activities that are not yet covered by an approved QAPP. Existing QAPP or associated standard operating procedures may need to be modified.

## 4.3 Monitoring Costs

Participation in VRAP will keep the monitoring costs to a minimum. VRAP provides hand-held field meters, datasheets, training and technical assistance. Several coastal watershed groups (e.g., Cocheco River Watershed Coalition) participate in VRAP which could facilitate sharing of equipment and delivery of samples to Concord. The other surveys require many volunteer hours for training sessions, field surveys, data management and reporting. Much of the sampling equipment, including GPS, clipboard and pencils, and tape measures are the same equipment required for multiple surveys. Expensive field equipment can be borrowed to minimize costs. Equipment that can be used on-loan include GPS meters, flow meters, digital cameras, water quality field meters and water testing supplies. This equipment can be borrowed from DES, UNH, the regional planning commissions, city departments and other watershed organizations. A digital camera is probably worth investing in based on it extreme usefulness in all the surveys and monitoring while providing photos for presentations, newsletters and other outreach materials. The financial support for a monitoring coordinator is also required but this is not reflected in the budget presented below.

**Table 13 Estimate Annual Monitoring Costs**

| Monitoring Activity | Lab analysis | Supplies and Equipment | Total Costs |
|---|---|---|---|
| VRAP (water quality) | 300 | 50 | $350 |
| Flow (discharge)[1] | 0 | 2,000 | $2,000 |
| Weed Survey | 0 | 50 | $50 |
| IDD Survey | 700 | 50 | $750 |
| Trash & Debris Survey | 0 | 300 | $300 |
| Programmatic Indicators | 0 | 0 | $0 |
| Estimated Annual Monitoring Costs | | | $3,450 |

1Note Costs after first year will decrease because purchase of meter will occur in year one.

## Acknowledgements

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Recognition is given to the following entities for their guidance and use of survey materials.

The California Regional Water Quality Control Board, Surface Water Ambient Monitoring Program for the rapid trash assessment for wadeable streams.

The New England Interstate Water Pollution Control Commission for the Illicit Discharge Detection and Elimination Manual: A Handbook for Municipalities.

EPA's The Volunteer Monitor, Summer 2003 publication for the article by Eleanor Ely titled, "Measuring Streamflow: How much, How fast."

The Hoosier Riverwatch information provided in the 2003 Volunteer Stream Monitoring Training Manual.

The Center for Watershed Protection provided an approach to stormwater retrofitting.

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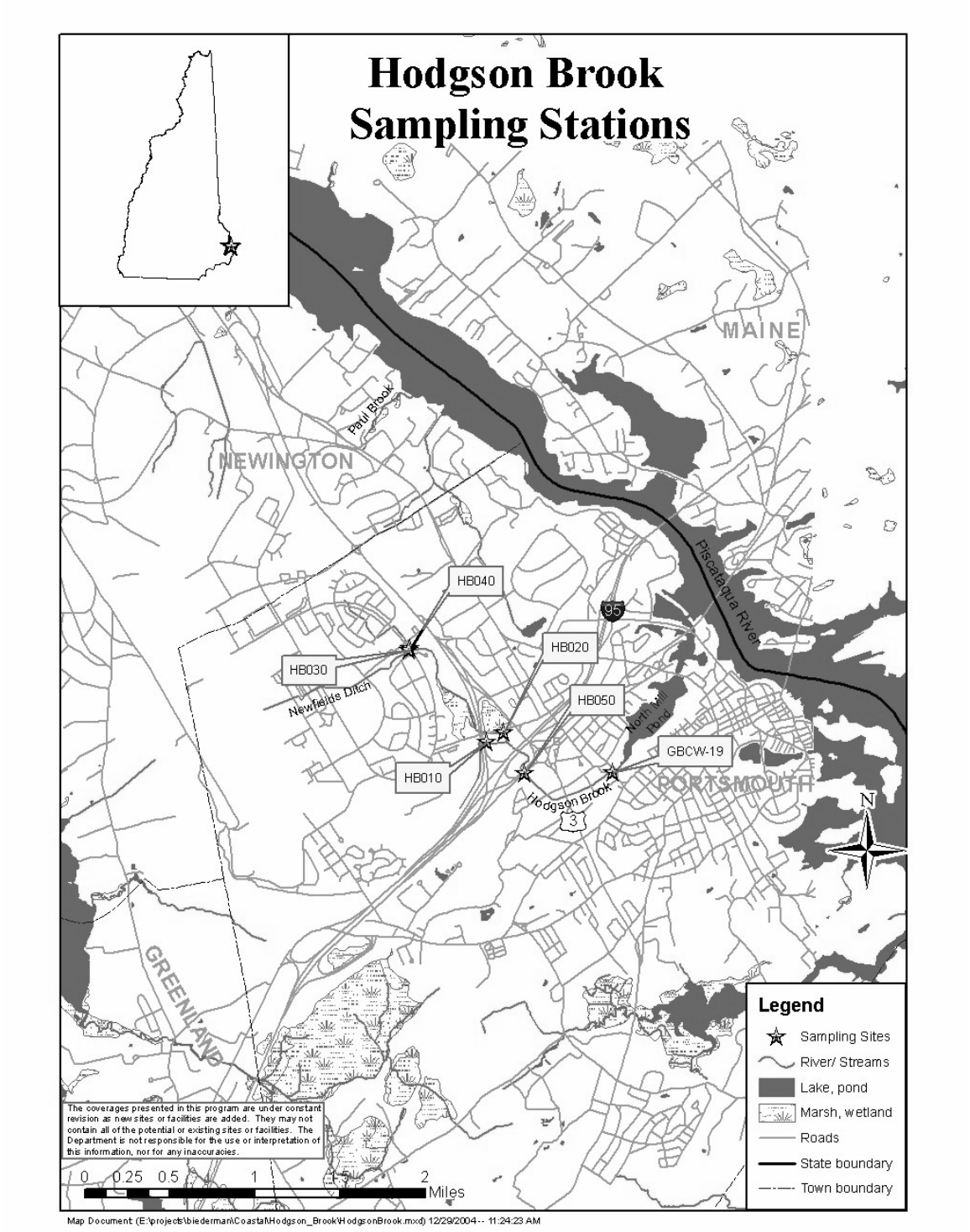
## Appendix A: Hodgson Brook Sampling Stations



## Appendix B: Field Data Sheet

# Volunteer River Assessment Program ~ Hodgson Brook
# Field Data Sheet

Date:_____ Start Time:_____ End Time (all monitoring activities for the day complete):_____

River: _____ Kit #_____ Volunteer Monitors Present: _____

Initial Turbidity Calibration Value _____ Time Dissolved Oxygen Meter Turned On _____
Initial Conductivity Calibration Value (175-225µS) _____ Time of 1st Dissolved Oxygen Calibration _____

| Station Code | Station Name | Time Sampled (HHMM) | Turbidity (NTU) | pH Cal. Slope ("SLP" = 92-102%) | pH (std. units) | Water Temp. (ºC) | Dissolved Oxygen Cal. (96-100%) | Dissolved Oxygen (mg/L) | Dissolved Oxygen (%sat.) | Dissolved Oxygen (%sat in chamber) | Air Temp (ºC) | Specific Conductance (µS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| _____R | Replicate at_____ | | | | | | | | | | | |

Zero Oxygen Reading (mg/L):_____ (% sat,): _____ Station:_____ Time:_____
6.0 pH buffer reading (5.8 – 6.3):_____ Station:_____ Time: _____
DI Blank Turbidity Reading: _____ Station:_____ Time: _____

**Weather Conditions:**
Current Weather (circle one): Clear Partly Cloudy Overcast Foggy Hazy Showers Downpour Snow Other:_____

Please describe the past three days' local weather. 1 day prior:_____ 2 days prior:_____ 3 days prior:_____

Sampling Preparation Checklist: (check if complete)
Scribe _____
Check maintenance log _____
Fresh solutions _____
Batteries _____
**Post Calibrations:**
pH Cal. Slope: _____
DO Cal.: _____
Turbidity (1.0 std.): _____
Conductivity (200 µS std.): _____
**End of the Day:** (check if completed)
**All meters:** dry and powered off _____

**DO:**
probe in chamber with wet sponge _____

**pH:**
probe upright in storage solution _____
blue plug secure _____

**Turbidity:**
sample vial rinsed and filled with DI water _____

**Conductivity:**
probe cleaned and in chamber _____
**VRAP kit:** clean of kimwipes, dirt, moisture _____

| Indicate presence of indicators for each sampling station. | | | | | | |
|---|---|---|---|---|---|---|
| | HB010 | HB020 | HB030 | HB040 | HB050 | GBCW-19 |
| Color | | | | | | |
| algal bloom | | | | | | |
| Foam | | | | | | |
| Debris | | | | | | |
| Scum | | | | | | |
| Slicks | | | | | | |
| Odors | | | | | | |
| surface floating solids | | | | | | |
| benthic deposits | | | | | | |

## Appendix C: Existing Monitoring in the Watershed

A few on-going monitoring programs are currently underway in the Hodgson Brook watershed and in North Mill Pond. Two monitoring programs are based on regulatory requirements and occur at specific locations in the former Pease Air Force Base. A volunteer monitoring program involves periodic monitoring of the mouth of Hodgson Brook and the outlet of North Mill Pond. And the final two monitoring programs assess baseline conditions in North Mill Pond.

### National Pollutant Discharge Elimination System

The Pease Development Authority (PDA), per requirement of their National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharges, collects monthly surface water samples at five selected sites in the Tradeport. These sites are Hodgson Brook (outfall #001), Flagstone Creek (outfall #002), McIntyre Brook (outfall#003), Harvey's Creek (outfall #004), and the wastewater treatment plant (outfall #005). Samples are analyzed for biological oxygen demand (BOD), surfactants, oil/grease, iron, zinc, lead, nickel and cyanide. The PDA reports these monthly results to the EPA in discharge monitoring reports (DMR). DES reviews monthly sample results for violations of permit limits.

### US Air Force Long-Term Monitoring Plan

After the Pease Air Force Base was closed in 1993, the Air Force instituted a long-term monitoring plan to determine the environmental status of the drainage basins with the Tradeport with regard to historical contamination that has been identified as public health or ecological risks through the CERCLA program. Both Grafton and Newfields Ditches are monitored. Newfields Ditch is monitored for groundwater and Grafton Ditch for surface water and sediments. Grafton Ditch surface waters are analyzed for volatile organic carbons (VOCs), semi-volatile organic carbons (SVOCs), pesticides, herbicides, dissolved metals and total metals. Sediment samples are analyzed for PAHs, PCBs, and metals. Results from the Long-Term Monitoring are published each April in an annual base-wide survey report.

### Great Bay Coast Watch

Great Bay Coast Watch (GBCW) is a non-profit volunteer organization which monitors estuarine waters to interpret the health and water quality of southeastern New Hampshire. The GBCW volunteer monitors collect water samples from various locations in the seacoast as part of a long-term water quality monitoring program. Samples are collected at both low and high tides and are analyzed for temperature, pH, salinity, DO, transparency and fecal coliform. Quality assurance and quality control measures ensure consistency of analytical procedures. The two sites in the GBCW network are Bartlett Street (Latitude 45.04.50, Longitude -70.45.54) and Maplewood Avenue (Latitude 43.11.42, Longitude -70.52.14). These sites are monitored for water quality purposes.

## National Coastal Assessment

National Coastal Assessment (NCA) is an EPA funded project that involves the assessment of the regional extent of environmental problems by measuring status and change in selected indicators of ecological condition (EPA, 2000). The NH NCA program is designed to assess the conditions in New Hampshire's estuarine waters during a five year period. Some of the sampling sites of NH NCA are located in North Mill Pond. These sites are NH05-0236 (Longitude -70.771, Latitude 43.076), NH 02-0237 (Longitude -70.762, Latitude 43.081) and NH04-0228 (Longitude -70.771, Latitude 43.073). Sediment samples are collected once every four years at each sample station to test ecological indicators. Sediments are collected for benthic species composition and abundance, chemical analyses, grain size determination, sediment characteristics, for use in acute toxicity tests, determining water column dissolved nutrients, chlorophyll a concentrations, total suspended solids concentrations, surface and bottom dissolved oxygen, salinity, temperature and pH (EPA, 2000).

## Gulfwatch

The NH Gulfwatch Program provides information to support sustainable use of the Gulf of Maine and assesses risk to public and environmental health from current and potential threats. The program uses blue mussels, *Mytilus edulis*, as an indicator for habitat exposure to toxic organic and trace metal contaminants. The program has one sample site in the North Mill Pond which is sampled annually for bacteria and organic/inorganic compounds in blue mussels and surface waters. The program has created a baseline database for contaminant exposure concentrations for NH mussels and provides a baseline of data for assessing impacts of accidental contaminant spills.